Technical Memorandum TRAC-F-TM-287
May 1987

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TRADOC Analysis Command-Fort Leavenworth (TRAC-FLVN)
Scientific and Technical Support Directorate
Fort Leavenworth, Kansas 66027-5200

ARMY 21 CONCEPT MODEL SELECTION PROCEDURE

by

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AD-A182 162

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION	1b. RESTRICTIVE MARKINGS
unclassified	

2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT
	Approved for public release;
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	distribution is unlimited

4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
TRAC-F-TM-287	

6a. NAME OF PERFORMING ORGANIZATION	6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION
TRADOC Analysis Command-Fort Leavenworth (TRAC-FLVN)	ATRC-FTM	

6c. ADDRESS (City, State, and ZIP Code)	7b. ADDRESS (City, State, and ZIP Code)
Fort Leavenworth, KS 66027-5200	

8a. NAME OF FUNDING/SPONSORING ORGANIZATION	8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER

8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS			
	PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO

11. TITLE (Include Security Classification)

Army 21 Concept Model Selection Procedure (unclassified)

12. PERSONAL AUTHOR(S)
Royce S. Hamlin, CPT Richard F. Brown, Jr. and Samuel S. Frohlichman

13a. TYPE OF REPORT	13b. TIME COVERED		14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Final	FROM _____	TO _____	May 1987	45

16. SUPPLEMENTARY NOTATION

17.	COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Army 21 Concept; Model Selection; Analytical Hierarchy
			Process (AHP)

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

Army 21 Concept Model Selection Procedure documents the procedure used to select a model to recommend for the viability and validity phases of the Army 21 Concept Study. The memorandum contains information on model requirements of the Army 21 Concept Study, and on the capabilities of the six candidate corps-level models to address the requirement methods used to develop the selection criteria, the development of the criteria weights, and the use of Saaty's Analytical Hierarchy Process (AHP) in determining the final model recommendation. Keywords: war games; computerized simulation; scenarios

20 DISTRIBUTION/AVAILABILITY OF ABSTRACT	21. ABSTRACT SECURITY CLASSIFICATION
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	unclassified

22a. NAME OF RESPONSIBLE INDIVIDUAL	22b TELEPHONE (Include Area Code)	22c OFFICE SYMBOL
Royce S. Hamlin	913/684-5418/541	ATRC-FTM

DD FORM 1473, 84 MAR

83 APR edition may be used until exhausted.
All other editions are obsolete.

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ABSTRACT

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Army 21 Concept Model Selection Procedure

1. __Problem.__ The feasibility part of the Army 21 Study has been completed using a tabletop war game. Because the viability and validity stages require a more sophisticated model, there existed a need to find a suitable model to support these phases for the Army 21 Study.

2. __Solution procedure.__

    a. Search. The best place to search for candidate models was in the most current, May 1986, Catalog of Wargaming and Military Simulation Models published by the Office of Joint Chiefs of Staff, Joint Analysis Directorate. The initial selection of models was based on whether they were corps level or above. They were rejected if they appeared to be:

        (1) Based on FEBA movement or "piston-type" movement.
        (2) Intended for large group training or CPX drivers, such as JESS.
        (3) Firepower comparisons with no apparent flexibility in maneuver or treatment of other areas such as logistics.
        (4) Labor-intensive manual games.
        (5) Extremely slow in game pace.

    b. Selected models. The resulting list included four models:

        (1) Corps Battle Analyzer (CORBAN).
        (2) Institute of Defense Analysis Hexagon Model (IDAHEX).
        (3) Joint Theater Level Simulation (JTLS).
        (4) State of the Art Contingency Analysis (SOTACA).

Two models were later added to the list as a result of suggestions by the Army 21 Operational Working Group. They were:

        (5) JIFFY.
        (6) Contingency Force Analysis Wargame (CFAW).

    c. Model selection criteria.

        (1) General. A set of general model selection criteria was developed (appendix A), based chiefly on the criteria used by the Scenario and Wargaming (SWG) Directorate in their R&D effort to select a model (short-term) as a scenario driver.

        (2) Concept specific. A second set of criteria (appendix B) was developed, aimed at the capability of each model to address the Army 21 concept issues (appendix C).

        (3) Standards. Standards were created for each set of criteria and are shown in the appendixes. The standards were used, along with the criteria, in interviewing the model experts and grading their responses.

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(4) Weighting. The TRAC-FLVN directors (individually) made pairwise comparisons of the model criteria and the Army 21 Operational Working Group performed the same procedure on the Army 21 criteria. For both sets, there were multiple sets of comparisons. The decision support software accepts only one set of comparisons. The technique for reducing this to one set was to calculate the geometric mean of the data. Once the geometric mean is calculated, a composite weighting of the criteria (attributes) are available for use in the decision support software (paragraph 2f).

d. Model experts.

(1) Selection. For two of the models, CORBAN and JIFFY, the expertise was available at FLVN, but for the others, a search was made for the most qualified persons in CONUS. The selection was based, in general, on whether an expert or his organization was involved in the models development, use, and/or management. Once the selections and contacts were made with the experts, arrangements were made to visit their organization for the purposes of obtaining data through interviews and observing the model in use.

(2) Interviews. All of the non-FLVN model interviews were completed as a result of a trip to the D.C./Carlisle, PA, area where the experts were located. The three-person interview team questioned and discussed each aspect of a model and the criteria with each interviewee until adequate results were acquired. The non-TRAC-FLVN persons interviewed per model were:

        JTLS   - Mr. Kunkel (AV 242-4169), Army War College,
                    Carlisle, PA.
                  LTC Duff (AV 225-1762), Project Manager, OJCS/J8,
                    Pentagon, Washington, D.C.

        IDAHEX - Dr. Kugler and COL McDivitt (AV 333-1094),
                    National War College, Ft. McNair, Washington, D.C.
                  Ms. Woodruff (202-764-2134), PARTECH Inc.
                    (contractor), Washington, D.C.

        SOTACA - LTC Theune (AV 225-1762), Project Manager, and
                    MAJ Carraway, OJCS/J8, Pentagon, Washington, D.C.

        CFAW   - COL Larson and Mr. LaPalma (AV 295-1680), Concepts
                    Analysis Agency, Bethesda, MD.

The TRAC-FLVN persons interviewed per model were:

        CORBAN - Ms. Shirley and MAJ Johnson, Systems Analysis
                    Directorate (SAD).

        JIFFY - Ms. Moody, Scientific and Technical Support
                    Directorate (STSD).
                  CPT Knapp, Scenario and Wargaming (SWG)
                    Directorate.

(3) Debugging. After completing all interviews, comparisons were made across all model responses, searching for inconsistencies and weak spots. If any problems were found, follow-on interviews were made by telephone or in person to clarify/complete the data.

e. Grading.

(1) General model criteria. The data gathered on the general selection criteria (appendix D) were put into a matrix (appendix E) for input into the decision-making software (paragraph 2f).

(2) Army 21 concept criteria. The data gathered on the Army 21 criteria were compared to the standards in appendix B and graded based on the following scale: 1 - not represented; 2 - approaches standard; 3 - met standard; 4 - exceeds standard; and 5 - greatly exceeds standard (appendix F). The grades were put into a matrix (appendix G) for input into the decision-making software discussed below.

f. Decision support software.

(1) General. A generalized decision-support procedure was developed by Dr. Thomas L. Saaty to aid decision makers in planning, prioritization, and resource allocation. This procedure, called the Analytical Hierarchy Process (AHP), was considered most appropriate for use in the Army 21 model selection process. Under the direction of Dr. Micheal R. Anderson, SAD, the procedure has been programmed into a usable software package. The software is currently available for use on the Hewlett-Packard (HP) 9816.

(2) Procedure. The AHP methodology consists of three interrelated tasks: the development of a hierarchical structure, the collection of paired comparison data at each level of the hierarchy based on the theory of eigenvalues and eigenvectors, and the computation of hierarchical valuations at the lowest level of the hierarchy.

(3) Usage.

(a) Loading software. After booting the HP using both the BASIC operating system and the extended BASIC system, load bin "Graph2_1" from the extended BASIC system disk, then load "AHP_B" from its disk. Enter [RUN]. Respond "yes" to the question, "Do you want a hardcopy?" and "no" (generally) to the question, "Do you want to retrieve a saved session?"

(b) Loading data.

1. The next questions require entry of the number of attributes followed by a short name for each. This is the method for describing each level of a hierarchy. For example, in the general model-selection matrix, there were two levels in the hierarchy: level one - the eleven criteria and level two - the six alternatives (models). Whereas, in the Army 21 concept matrix, there were three levels: level one - the seven major criteria, level two - the various number of subcriteria for each major criteria, level three - the six alternatives for each subcriteria.

2. After the attribute number and names are entered, the software cycles through all pairwise comparisons of the attributes, prompting the user to enter the more important of each pair of attributes. After stating the importance of one attribute over another, the degree of importance is entered based on the weighting data for each pair of attributes. For the general model criteria, this was the set of comparisons resulting from taking the geometric mean of the TRAC-FLVN directors' comparisons. For the Army 21 concept criteria, this was the set of comparisons resulting from taking the geometric mean of the Army 21 Operational Working Group comparisons. After entering the above data at each level of the hierarchy, this same process continued with the data gained from the interviews. In this case, the data actually entered is based on the pairwise comparison of the data across all alternatives for each criteria.

(c) Output.

1. The output resulting from the above procedure is a printout after each subcategory of a level containing the comparison matrix data entered and a list of the attribute names, their resulting values (which sum to 1.0), and a measure of inconsistency. For example, in the Army 21 criteria matrix, there were seven major criteria, each with some number of subcriteria and six alternatives under each subcriteria. This printout occurred after entering the seven major criteria, after each subcriteria, and after each set of alternatives. This output was used primarily to rank order the criteria.

2. A list of weights is output for the attributes/alternatives when a level is completed (which sums to 1.0). For example, in the Army 21 matrix, the first list of weights for level one is contained in the output discussed above. The list for the second level was the weights for all subcriteria which again summed to 1.0. The list for the third level was the weights for all alternatives for each subcriteria which also summed to 1.0. The list for level two was not useful, but the list for level three was used to rank order the alternatives.

3. The list for the last level requires some processing. Since a value is output for all alternatives for each subcriteria, these values must be summed for each alternative. For example, in the Army 21 matrix, the number of 222 values in the list were based on 37 subcriteria times the 6 alternatives. This means there were 37 values for each alternative model that had to be summed to derive the score or value of the model. From these scores, the alternatives were ranked.

(d) Problems. The software, as currently written, has several problems that could cause a lot of extra work if the user is ignorant of them. This is especially true if the size of the hierarchy or amount of data to be entered is large. Problems discovered while running the software are listed below.

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        1. The main problem is that the data entered is not accessible to the user once it is saved. However, if the data is not saved periodically and a significant error occurs, the user must reenter the data starting back where it was last saved.

        2. A related problem deals wih getting a hard copy of the output. When the software innocently asks if the user wants a hard copy of the output, the user should say yes because he may not get another chance. For example, the first time we ran the program, we declined the printout in order to speed up the process (thinking we could print out the result later from the saved data). This is not the case.

3. Results. The rank ordering and associated scores of the alternative models resulting from this procedure are listed below.

   a. Main model selection criteria.

CORBAN	JTLS	SOTACA	JIFFY	IDAHEX	CFAW
.180	.174	.172	.169	.164	.141

   b. Army 21 concept criteria.

CORBAN	JTLS	IDAHEX	CFAW	JIFFY	SOTACA
.212	.197	.173	.153	.141	.124

4. Discussion. Since several of the model scores are relatively close, questions arise about the significance of the differences. Two main issues are important to consider: human mental capabilities and degree of practical significance.

    a. Human judgments comprise the bases for these derived weights. Therefore, from a human factors viewpoint, it is necessary to view these results as estimates of the relative weights for the various models. Due to the human component, the precision of the estimates are subject to the unreliabilities associated with all human judgments (e.g., variations in thought processes from day-to-day, mood swings, health, etc.). Consequently, values that deviate from one another by just two or three hundreds should be viewed as equivalent for all practical purposes.

    b. The degree of practical significance is also important to consider in making a decision based on these results. The number one model, CORBAN, receives proportional weights of .180 and .212 on the main model selection criteria and Army 21 concept criteria, respectively. These results indicate that CORBAN's desirability is approximately 1/5 of the normalized total of 1.000 on both counts. The reader should note that these measurements are based on a relative ratio scale; that is, weights can be compared on a multiplicative basis. For instance, in comparing CORBAN versus JTLS on the Army 21 concept criteria results, .212/.197 indicates that CORBAN is 1.08 times more desirable than JTLS and 1.71 (.212/.124) times more desirable than SOTACA. Analogous ratio comparisons can be made between any other two model scores.

(1) Obviously, as the relative ratio weights deviate from the comparison value of 1.000, more practical significance is shown for the larger value over the smaller. Thus, the user can elect a minimal level for the ratio in order to define a practical level of significance. A factor in establishing the minimum ratio should be a consideration of the human capabilities to discriminate as discussed above. Failure to exceed the ratio for practical significance indicates the two elements being compared are equivalent for all practical purposes.

(2) For this comparison of models a ratio of 1.10 is defined to be minimum ratio for practical significance. This corresponds to a 10-percent increase in the ratio of scores before a practical significance is said to exist. With respect of the main model selection criteria and the top rated model, CORBAN, only CFAW is deemed to be significantly different from CORBAN with a comparison ratio of 1.277. JTLS, SOTACA, JIFFY and IDAHEX are not with relative ratios of 1.034, 1.047, 1.065 and 1.098, respectively. Analogously, with respect to the Army 21 concept criteria and top rated model, CORBAN, only JTLS is found not to be significantly different from CORBAN with a relative ratio of 1.076. IDAHEX, CFAW, JIFFY and SOTACA are deemed to be significantly different from CORBAN with relative ratios of 1.225, 1.386, 1.504 and 1.710, respectively.

c. This information was presented to the Army 21 Study team. The model selection decision is still pending because the study may be put on hold indefinitely.

APPENDIX A

MODEL SELECTION CRITERIA

1. PERSONNEL REQUIREMENTS. The number of gamers, controllers, analysts, and modelers needed to conduct gaming. Fewest is best.

2. HARDWARE REQUIREMENTS. The hardware needed to run the model. Hardware that is currently located at Ft. Leavenworth is required. The ranking values are: 1 - 100% on-hand and 2 - not 100% available.

3. TRAINING TIME. An estimate of time needed to train new gamers, controllers, and analysts on the use of the model. Least is best.

4. SETUP TIME. The total time required to obtain, verify, load, and check out a data base. Least time is best.

5. GAME PACE. An estimate of time needed to prepare and execute a game day of combat. Recorded as a ratio; highest is best.

6. ANALYSIS TIME. An estimate of the time needed to analyze output and to prepare a report after the end of gaming. Shortest is best.

7. DOCUMENTATION. An evaluation of the documentation with regard to user information, methodology description, data definition, commented program code, on-line help, training and summary information. Adequate and most current is best.

8. SIMULTANEOUS GAMES. An estimate of the number of games that could be run simultaneously considering available hardware resources. Most is best.

9. INSTALLATION. The total time to get the model installed at FLVN. Least is best.

10. TRANSPARENCY. The ease with which the user can see and understand the working of the model. The ranking values are: 1 - good, 2 - fair, and 3 - poor.

11. CONTROLLABILITY. The ease with which the user can control the events occurring in the model. The ranking values are: 1 - good, 2 - fair, and 3 - poor.

ARMY 21 CRITERIA & STANDARDS

DECISION CRITERIA	STANDARDS
===	===
INDEPENDENT OPERATIONS	
Flexibility	Allows immediate reaction to situation.
Fast paced	Allows constantly changing situation.
DISCONTINUOUS BATTLEFIELD	
Avoid combat	Allows avoidance of combat.
Specified unit	Gamer can designate unit(s) to be engaged.
Maneuverability	Allows various attacks with emphasis on flank & rear.
Hit & run	Allows attrition of enemy units w/o becoming decisively engaged.
Elastic defense	Allows enemy unit to pass thru area and be subject to delay /attrition.
Force definition	Allows light, medium, & heavy CCF play.
Airlift	Allows explicit play of air movement of ground forces.
Landings	Allows airdrop of men and supplies.
COMMAND AND COMMANDER (C2)	
Multiple assets	Allows coordinated air & arty fires.
Synchronized execution	Allows synchronized execution.
Battle sequence repetition	Allows continuous scan, swarm, strike, and scatter.
Headquarters	Executes commander's intent thru C2 hqs.
C2 degradation	Allows C2 degradation.
Communications	Allows COMMO delays and spoofing.

ARMY 21 CRITERIA & STANDARDS

| DECISION CRITERIA | STANDARDS |
|===|===|

INTELLIGENCE

SITREP	Allows play of SITREP.
Deception	Allows portrayal of dummy units.
Sensors	Allows explicit sensor play incl degradation & spoofing.

SUSTAINMENT

Blue/Red	Allows play of doctrinal differences in log systems.
Highly mobile	Allows log units to rapidly link up with combat units.
Degradation	Allows attrition of log units.
Self-contained	Allows lengthy independent operations.
Reconstitution	Allows reorganization/ regeneration.
Consumption	Allows play of consumption of classes III & V.

PROJECT COMBAT POWER

Rapid concentration	Allows rapid projection of combat power from higher hqs anywhere on the battlefield.
Combat arms	Allows play of ground direct & indirect fires (incl ADA).
Deep fires	Allows attack of user specified enemy units at a specified point and time.
Chemical	Allows offensive and defensive chemical operations.
NUC	Allows offensive and defensive operations.
TAC AIR/ ATK HELOS	Allows attack of user specified units at a specified point and time.

MOVEMENT/MANEUVER

Agility	Allows maneuver/combat over a large % of AO, rapid unit reorientation, & rapid mvmt.

DECISION CRITERIA	STANDARDS
===================	===========
Combat	Must be degraded for combat.
Barrier	Must be degraded for terrain modification.
Chemical	Must be degraded for chemical contamination.
Terrain	Must be degraded by terrain.
Environment	Allows degradation by day/ night and weather.

DECISION CRITERIA   STANDARDS

APPENDIX C

ARMY 21 CHARACTERISTICS

1. Independent, autonomous operations by tactical forces.

    Impact:
    - need to react to situations as they occur
    - constantly changing situation (fast-paced operations)
      * interactive or fast running, interruptible model needed
      * ability to replicate runs secondary to this neeo

2. Numerous small battles conducted on a nonlinear, noncontiguous battlefield.

    Impact:
    - ability to avoid combat
      * Blue must be able to "pick its fights"
      * gamers designate which units are to be engaged
    - emphases on flank/rear attacks
    - small Blue units attacking a "portion" of a large Red unit
      * able to avoid decisive engagement
      * allow Red unit to pass through area occupied by a CCF, suffer attrition and/or delay without destroying the CCF
      * similar to light infantry tactics
    - heavy reliance on augmented movement (air) of ground forces
      * explicit play of airlift assets
      * limited restrictions on landing sites

3. Rapid planning and execution of synchronized swarms and strikes using multiple assets (e.g., direct fire, indirect fire, air).

    Impact:
    - ability to synchronize operations is essential
      * routine requirement
      * interactive or fast interruptible model needed
    - rapid shifting of assets based on the situation
    - repetition of swarm-strike-scatter sequence (more battles)
    - Blue ability to make and execute decisions faster than Red
      * possible to play off-line
      * incorporate into delay time for order execution
    - C2 hqtrs (BTF) synchronizes CCF swarm and strikes

4. Highly reliable, near real-time information gathering and analysis capability (scan).

    Impact:
    - difficult for either side to "hide" (units can see deep)
    - varying quality of information available
      * could use controller to accomplish
      * some disruption of C3I possible
      * ability to incorporate deception (e.g. dummy units)
    - capability to identify enemy flanks/rear and available combat power essential (ID enemy weaknesses)

5. Unit capability to move approximately 600km per day and change
    directions (reorient) by as much as 180 degrees several times
    per day by organic means.

    Impact:
      - maneuver/combat spread over a large % of AO
      - area played may be as large as 1200 x 900 km
      - Blue reorientation capability is essential

6. Highly mobile, self-contained logistics units capable of
providing sustainment and regeneration support to maneuver units
to the battlefield.

    Impact:
      - log units move independently of maneuver units
        * essentially mobile supply points
        * synchronized linkup with maneuver units
      - log units have ability to avoid combat (limited protection)
      - provides either aggregate sustainment consumption or specific
        class III and V

7. Capability to project combat power, via direct and indirect
means (e.g. from LBF), and rapidly shift it (reorient, reallocate).

    Impact:
      - rapid concentration of combat power from dispersed locations
      - reduced need to close within short distances of enemy
      - able to avoid decisive engagement (hit and run capability)

APPENDIX D

MODEL CRITERIA RESPONSES AND SCORES

DECISION CRITERIA	CFAW	SCORE
HARDWARE REQUIREMENT	VAX 11780; RAMTEC 9460/65; Changing to JTLS/JESS graphics	1
DOCUMENTATION	No documentation, but some commented code.	5%
CONTROL	Gamer enters orders directly to each unit, so has a lot of control.	1
TRANSPARENCY	Has good graphics and the gamer can query a unit at any time interactively.	1
GAME PACE	12 to 18 game hours to 1 clock hour (12/1). Can avg 3 game days per real day (9/1).	9:1
PERSONNEL REQUIREMENT	2 Blue; 2 Red; 2 controllers (1 tech & 1 ump)	6
ANALYSIS TIME	2 people for 4 wks to do analysis and report.	8
TRAINING TIME	Controller: Umpire - 4 wks; Tech controller - 15 to 25 wks Gamers - 1 week.	20
SETUP EFFORT	7 wks with 4 people (optimum) to start from scratch(a must).	28
INSTALLATION	Need just enough time to request, receive, and install tape, approx. 3 weeks.	3
SIMULTANEOUS GAMES	5 games (DEC eqpmt).	5

MODEL CRITERIA RESPONSES AND SCORES

DECISION CRITERIA	CORBAN	SCORE
HARDWARE REQUIREMENT	DEC equipment; hi-speed printer, plotter & 2 terms. Available at SWG.	1
DOCUMENTATION	Complete set but poor code comments.	92%
CONTROL	Very fast running, gamer can enter new orders & re-run game to affect desired result.	2
TRANSPARENCY	Gamers can get C2 tracers & other output during the running of the game.	2
GAME PACE	5 hours game to 1 clock hour VAX 11/785; 4 hrs game to 1 clock hr on Micro VAX. Can turn around one 24 hr game day in 8 hrs.	3:1
PERSONNEL REQUIREMENT	Min of 3; 5 optimum: 1-2 Blue; 1-2 Red; 1 Controller.	3
ANALYSIS TIME	2 people for 1 week.	2
TRAINING TIME	Min of 6 wks; good 20 wks; expert 24 weeks.	20
SETUP EFFORT	2 people for 6 wks (4 wks data load & 2 wks testing) with DB available.	12
INSTALLATION	Already installed and operational.	0
SIMULTANEOUS GAMES	5 games (DEC eqpmt).	5

MODEL CRITERIA RESPONSES AND SCORES

DECISION CRITERIA	IDAHEX	SCORE
===================	========	=======
HARDWARE REQUIREMENT	DEC equipment; no graphics until June. Available at SWG.	1
DOCUMENTATION	Game design and player's manual only. Documented in the 70s and poorly commented source code.	40%
CONTROL	Gamer specifies time increment at beginning of game; cannot enter orders until interrupt.	3
TRANSPARENCY	Produces hourly game reports. No graphics.	3
GAME PACE	4 game days per real day. (96 hrs/8hrs = 12/1)	12:1
PERSONNEL REQUIREMENT	3 (1 Blue; 1 Red; 1 Controller).	3
ANALYSIS TIME	2 people for 1 week.	2
TRAINING TIME	Gamers 1 to 2 weeks; Controller 6 to 8 weeks minimum, if controller must know code for modification, will take much longer.	7
SETUP EFFORT	2 people for 2 weeks.	4
INSTALLATION	3 weeks at most.	3
SIMULTANEOUS GAMES	5 games (DEC eqpmt).	5

MODEL CRITERIA RESPONSES AND SCORES

DECISION CRITERIA	JIFFY	SCORE
===	===	===
HARDWARE REQUIREMENT	UNIVAC and at least 1 terminal. Available at SWG & DPFO.	1
DOCUMENTATION	95% complete, but old and out of date. Source code is fairly well commented. Model is full of bandaids; needs considerable work.	75%
CONTROL	Gamers have total control.	1
TRANSPARENCY	Gamers have complete knowledge.	1
GAME PACE	8 hrs of game time to 1 hr of clock time. 1 work week for 6 hrs of game.	1:6
PERSONNEL REQUIREMENT	6 gamer/analysts;1 modeller; 3 controllers are optimum. 2 gamers/analysts, 1 modeller, 1 controller is minimum.	4
ANALYSIS TIME	3 people for 4 weeks.	12
TRAINING TIME	4 weeks (4 wks controller; 1 week gamers).	4
SETUP EFFORT	2 persons for 8 weeks, not starting from scratch.	16
INSTALLATION	Available at FLVN, approximate 1 week.	1
SIMULTANEOUS GAMES	Can run numerous games on UNIVAC; constrained by number of terminals available (4).	4

MODEL CRITERIA RESPONSES AND SCORES

DECISION CRITERIA	JTLS	SCORE
HARDWARE REQUIREMENT	DEC equipment; 4 terminals; 4 JESS/JTLS graphics work stations. VAX available at SWG but necessary graphics hardware must be purchased. OPA money has been requested at $73,020 (+$900/mo maintenance)	2
DOCUMENTATION	Complete & very good. Source code released & well commented	100%
CONTROL	Gamer can enter orders to change unit postures, move support units, etc.	1
TRANSPARENCY	Good. Video display, locations, who is in combat, unit status, etc., very quickly.	1
GAME PACE	With ground only or ground & negligible air, can get 2 game days per clock day (6/1); with ground & extensive air can get 1 game day per clock day (3/1)	6:1
PERSONNEL REQUIREMENT	Red: 1-2 air, 1-2 ground; Blue: 1-2 air, 1-2 ground; 1 controller; 1-2 modellers.	6
ANALYSIS TIME	Most of the analysis is done in approx 1 hr between game days. Allow 2 persons for 3 more wks to complete analysis & produce a report.	6
TRAINING TIME	2 wks DB/SCENARIO familiarization; 3 wks preprocessor/ terminal use/ etc.	5
SETUP EFFORT	2 persons for 18 wks to build DB from scratch (incl air). AWC has SWA & Euro DBs- saves 12 m-w, so 2 people for 12 wks (24 m-w).	24
INSTALLATION	Cannot be installed before grahics hardware is received; 5 mos after ordered (OPA).	20

DECISION CRITERIA	JTLS	SCORE
SIMULTANEOUS GAMES	Currently, FLVN does not have the hardware configuration to run JTLS. JESS suites are correct hardware, but graphics are run by mini-VAX.	O

MODEL CRITERIA RESPONSES AND SCORES

DECISION CRITERIA	SOTACA	SCORE
===================	========	=======
HARDWARE REQUIREMENT	VAX computers; Tecktronic type terminals (4205/07/09). All but Tektronic terminal available at FLVN. OMA money available ($4700) for purchase	2
DOCUMENTATION	Adequate user's manual and analysts manual. No data dictionary. No source code released.	70%
CONTROL	Very good. The gamer has almost total control except for final results.	1
TRANSPARENCY	Very good. The gamer has near total knowledge.	1
GAME PACE	Cycle time set by gamer; 30 sec/cycle; 30-40 cycles per hour with 1 gamer and a simple situation; normally takes 1 hr for normal 8 hr cycle.	8:1
PERSONNEL REQUIREMENT	1 person (+any reqd experts). Approximately 3 average.	3
ANALYSIS TIME	1 gamer for 1 week.	1
TRAINING TIME	Good in 6 weeks; 1-2 wk formal course; 4-5 wks familiarity. Training course is required by PM before installation.	6
SETUP EFFORT	2 hrs to several wks. About 1 person for 2 weeks on the average.	2
INSTALLATION	Can be installed as soon as the Tektronic terminal arrives and is connected to the VAX. OMA purchase, etc, will take aprox 6 mos.	24
SIMULTANEOUS GAMES	Currently we do not have the needed graphics hardware; the game can be run w/o it, but not satisfactorily.	0

APPENDIX E

MODEL CRITERIA SUMMARY MATRIX

DECISION CRITERIA	CFAW	CORBAN	IDAHEX	JIFFY	JTLS	SOTACA
HARDWARE REQUIREMENT	1	1	1	1	2	2
DOCUMENTATION	5%	92%	40%	75%	100%	70%
CONTROL	1	2	3	1	1	1
TRANSPARENCY	1	2	3	1	1	1
GAME PACE	9:1	3:1	12:1	1:6	6:1	8:1
PERSONNEL REQUIREMENT	6	3	3	4	6	3
ANALYSIS TIME	8	2	2	12	6	1
TRAINING TIME	20	20	7	4	5	6
SETUP EFFORT	28	12	4	16	24	2
INSTALLATION	3	0	3	1	20	24
SIMULTANEOUS GAMES	5	5	5	4	0	0

ARMY 21 STANDARDS
MODEL: CFAW

DECISION CRITERIA	STANDARDS	ATTRIBUTES
PROJ. COMBAT POWER		
Rapid concentr.	Allows rapid projection of combat power from higher hqs anywhere on the battlefield.	Yes, through gamer orders. (3)
Deep fires	Allows attack of user specified enemy units at a specified point and time.	Can attack deep but not a specific unit. (2)
Combat arms	Allows play of ground direct & indirect fires (incl ADA).	Yes, both can be included in unit, ADA has limitations. (3)
TACAIR/ ATK HELOS	Allows attack of user specified units at a specified point and time.	Air units given by unit size not by unit type. (3)
Chemical	Allows offensive and defensive chemical operations.	One for both sides, affects all unit type equally by random draw. (2)
Nuclear	Allows offensive and defensive operations.	same as above, however, affects larger unit first. (2)
MOVEMENT/MANEUVER		
Agility	Allows maneuver/combat over a large % of AO, rapid unit reorientation, & rapid movement.	No reorientation, moves based on terrain, weather, etc. (2)
Combat	Must be degraded for combat.	Once in combat no mvmt occurs. (2)
Terrain	Must be degraded by terrain.	Yes. (3)
Barrier	Must be degraded for terrain modification.	Each edge of hex is catagorizd for rate of unit mvmt across hex. Plays mines. (4)
Environment	Allows degradation by day/ night and weather.	Combat is not degraded by environment but movement is. (2)

DECISION CRITERIA	STANDARDS	ATTRIBUTES
Chemical	Must be degraded for chemical contamination.	Entire hex contaminated & effects delay & attrition to units in hex. (4)
C2		
Synch execution	Allows synchronized execution.	Attempted through orders but not guaranteed. (2)
Multiple assets	Allows coordinated air & arty fires.	No, estimates only. (1)
Battle sequence repetition	Allows continuous scan, swarm, strike, and scatter	Through preplanned orders; no guarantees about coordinated attacks. (2)
Degradation	Allows C2 degradation.	Data input. One fractional value used for all messages. (2)
Headquarters	Executes commander's intent thru C2 hqs.	No, through controller. (1)
Communications	Allows COMMO delays & spoofing.	No commo delays or spoofing, disruption only. (1)
INTELLIGENCE		
Deception	Allows portrayal of dummy units.	Developed during preproc phase (extra units). (3)
Sensors	Allows explicit sensor play incl degradation & spoofing.	Yes, national, air and human sensor play. No spoofing. (3)
SITREP	Allows play of SITREP.	Scans, identifies, and determines action by air sensor only. Mvmt is also det. (2)
DISCONTINUOUS BF		
Maneuverability	Allows various attacks with emphasis on flank & rear.	Model does not play unit orientation. (2)
Hit & run	Allows attrition of enemy units w/o becoming decisively engaged.	Yes, set dynamic threshold for this action; depends on % of loss. Withdraws if < 2%. (3)

DECISION CRITERIA	STANDARDS	ATTRIBUTES
Specified unit	Gamer can designate unit(s) to be engaged.	Yes, can direct many units against 1 by locating them into adjacent hexes. (3)
Avoid combat	Allows avoidance of combat.	No, there is automatic battl if opposing forces are in adjacent hexes. (1)
Force defi- nition	Allows light, medium, & heavy CCF play.	Has wpn cutoff value depende on terrain. Gamer specify ho many wpn cat/terrain type. (3)
Elastic defense	Allows unit to pass thru area and be subject to delay /attrition.	No, done off-line by control (1)
Airlift	Allows explicit play of air movement of ground forces.	Yes, two ways: with organic assets or thru airmobile uni (4)
Landings	Allows airdrop of men and supplies.	Yes, no constraints on land- ing. Units are flown to hex and air unit returns. (3)

SUSTAINMENT

Consumption	Allows play of consumption of classes III & V.	Can play up to 12 classes of supplies. (5)
Blue/Red	Allows play of doctrinal differences in log systems.	Only one resupply system. (1)
Reconstitution	Allows reorganization/ regeneration.	Model does 100% reconstituti but reorganization is done off-line. (3)
Degradation	Allows attrition of log units.	No, off-line with controller but no transport play. (1)
Highly mobile	Allows LOG units to rapidly linkup with combat units.	Off-line by controller. (1)
Self-contained	Allows lengthy independent operations.	Yes, through loading additior al supplies in units. (3)

DECISION CRITERIA	MODEL: CFAW STANDARDS	ATTRIBUTES
INDEPENDENT OPS		
Flexibility	Allows immediate reaction to situation.	Through player control. Gamer give direct orders to unit as game proceeds. (2)
Fast paced	Allows constantly changing situation.	Through player control. Gamer give direct orders to unit as game proceeds. (2)

DECISION CRITERIA	STANDARDS	ATTRIBUTES
PROJ. COMBAT POWER		
Rapid concentr	Allows rapid projection of combat power from higher hqs anywhere on the battlefield.	Done through orders. (3)
Deep fires	Allows attack of user specified enemy units at a specified point and time.	Done through orders. (3)
Combat arms	Allows play of ground direc & indirect fires (incl ADA).	Done automatically and thru orders. (3)
TACAIR / ATK HELOS	Allows attack of user specified units at a specified point and time.	Done through orders. (3)
Chemical	Allows offensive and defensive chemical operations.	No chem play, can be done off-line. (1)
Nuclear	Allows offensive and defensive operations.	No nuc play, new version here but not tested. (1)
MOVEMENT/MANEUVER		
Agility	Allows maneuver/combat over a large % of AO, rapid unit reorientation, & rapid movement.	No limit except by DB. (3)
Combat	Must be degraded for combat.	Posture dependent. (4)
Terrain	Must be degraded by terrain.	Yes. (3)
Barrier	Must be degraded for terrain modification.	No. (1)
Environment	Allows degradation by day/ night and weather.	No, but there is a day/night/ smoke module being developed. (1)
Chemical	Must be degraded for chemical contamination.	No. (1)
C2		
Synch execution	Allows synchronized execution.	Can order units but will be a very difficult & time consuming task. (2)

DECISION CRITERIA	MODEL: CORBAN STANDARDS	ATTRIBUTES
Multiple assets	Allows coordinated air & arty fires.	Yes, through orders. (3)
Battle seq. rep.	Allows continuous scan, swarm, strike, and scatter.	Yes, except units may not be able to scatter (disengage). (2)
Degradation	Allows C2 degradation.	Yes, time delay until alternate unit is designated by the model. (4)
Headquarters	Executes commander's intent thru C2 hqs.	Yes. Put orders in queue. Cycles through units periodically from top (hqs) down through units checking order queue and acting on orders. (4)
Communications	Allows commo delays & spoofing.	Allows commo delays but no spoofing. Commo always get through without degradation. (3)

INTELLIGENCE		
Deception	Allows portrayal of dummy units.	Yes. Units without systems. (3)
Sensors	Allows explicit sensor play incl degradation & spoofing.	Explicit sensor play, no jam, EW, or spoofing. (2)
SITREP	Allows play of SITREP.	Yes, units know superior, subordinates and threat. Update every cycle (10 minutes). (4)

DISCONTIN. BF		
Maneuverability	Allows various attacks with emphasis on flank & rear.	Yes, allows many maneuvers. This is done through orders. (4)
Hit & run	Allows the attrition of enemy units w/o becoming decisively engaged.	May be possible through altering the force ratio. (2)
Specified unit	Gamer can designate unit(s) to be engaged.	Yes, through orders. (3)
Avoid combat	Allows avoidance of combat.	Units are automatically engaged. Units come within their direct fire wpn ranges. (1)

DECISION CRITERIA	MODEL: CORBAN STANDARDS	ATTRIBUTES
Force definition	Allows light, medium, & heavy CCF play.	Yes, light need to be reviewed & additional templates built. (3)
Elastic defense	Allows unit to pass thru area and be subject to delay /attrition.	No. (1)
Airlift	Allows explicit play of air movement of ground forces.	Yes, physically attaches man- euver unit to air unit crosses terrain, detaches and returns. (3)
Landings	Allows airdrop of men and supplies.	Does people but not supplies explicitly. (2)

SUSTAINMENT

Consumption	Allows play of consumption of classes III & V.	Yes. (3)
Blue/Red	Allows play of doctrinal differences in log systems.	Allows play of push / pull. (3)
Reconstitution	Allows reorganization/ regeneration.	Reorganizes automatically. Re- generation done thru orders. (3)
Degradation	Allows attrition of log units.	Does allow attrition of log units. (3)
Highly mobile	Allows log units to rapidly link up with combat units.	Yes, ATPs or convoys could be used and orders issued. (3)
Self-contained	Allows lengthy independent operations.	Yes, load additional assets into units during preproc. (3)

INDEPENDENT OPS

Flexibility	Allows immediate reaction to situation.	Yes, through ORS and orders created before & during game. (4)
Fast paced	Allows constantly changing situation.	Gamer orders or the computer (through ORS) given the right (4)

DECISION CRITERIA	STANDARDS	ATTRIBUTES

PROJ. COMBAT POWER

Rapid Concentr.	Allows rapid projection of combat power from higher hqs anywhere on the battlefield.	Through gamer's orders. (3)
Deep fires	Allows attack of user specified enemy units at a specified point and time.	Not with arty units only with air units. (1)
Combat arms	Allows play of ground direct & indirect fires (incl ADA).	Plays ground direct & in-direct fires but no ADA. (2)
TACAIR/ ATK HELOS	Allows attack of user specified units at a specified point and time.	Yes, but air assets have to be kept track of off-line. (3)
Chemical	Allows offensive and defen-sive chemical operations.	No. (1)
Nuclear	Allows offensive and defensive operations.	No. (1)

MOVEMENT/MANEUVER

Agility	Allows maneuver/combat over a large % of AO, rapid unit reorientation, & rapid movement.	Through gamer's orders; there are time delays in data base by unit type. (3)
Combat	Must be degraded for combat.	Yes, determined by force ratios / disengagement delays. (4)
Terrain	Must be degraded by terrain.	Yes, data input is a function of unit type. (3)
Barrier	Must be degraded for terrain modification.	Plays barriers both natural and combat. (4)
Environment	Allows degradation by day/ night and weather.	No. (1)
Chemical	Must be degraded for chemi-cal contamination.	Chem affects can be played. (3)

C2

Synch execution	Allows synchronized execution.	Yes, you can time your attks (3)
Multiple assets	Allows coordinated air & arty fires.	Just ground play, air is played off-line.

DECISION CRITERIA	STANDARDS	ATTRIBUTES
===	===	===
Battle sequence repetition	Allows continuous scan, swarm, strike, and scatter.	No. (1)
Degradation	Allows C2 degradation.	No. (1)
Headquarters	Executes commander's intent thru C2 hqs.	No. (1)
Communications	Allows commo delays & spoofing.	Think so, hasn't been validated. (1)

INTELLIGENCE

Deception	Allows portrayal of dummy units.	Could create with no assets would subject to attack. (3)
Sensors	Allows explicit sensor play incl degradation & spoofing.	No. (1)
SITREP	Allows play of SITREP.	Through the engagement repor that given at the end of eac time increment. Info is cur- rent only on units that are engaged & friendly unit stat (3)

DISCONTINUOUS BF

Maneuverability	Allows various attacks with emphasis on flank & rear.	Yes, done through gamer's orders. (3)
Hit & run	Allows attrition of enemy units w/o becoming decisive- ly engaged.	Yes, can order unit to engag and then go back to it's ori- ginal location which stops the conflict. (3)
Specified unit	Gamer can designate unit(s) to be engaged.	Yes, gamer must unless unit attacked. (4)
Avoid combat	Allows avoidance of combat.	Yes, in order to engage must order conflict unless occupy- ing the same hex. (4)
Force definition	Allows light, medium, & heavy CCF play.	Yes, must be defined through data input (i.e., unit type & equipment). (3)

MODEL: IDAHEX

DECISION CRITERIA	STANDARDS	ATTRIBUTES
Elastic defense	Allows unit to pass thru area and be subject to delay /attrition.	No, by attempting to occupy the same hex, engagement is automatic. (1)
Airlift	Allows explicit play of air movement of ground forces.	Controlled off-line; can be done but not easily; must be done by controller by deactivating & activating units. (2)
Landings	Allows airdrop of men and supplies.	Yes, allows resupply anywher personnel are played as equip (3)
SUSTAINMENT		
Consumption	Allows play of consumption of classes III & V.	Can be done with 4 - 5 class es of supplies (incl III & V (4)
Blue/Red	Allows play of doctrinal differences in log systems.	Yes, through data inputs; cre ated in data base. (3)
Reconstitution	Allows reorganization/ regeneration.	Can order units to merge; ca spin-off units; there is an infinite amnt of resupplies. (3)
Degradation	Allows attrition of log units.	Trucks can be hit by air but the model represents unlimit- ed resupplies. (2)
Highly mobile	Allows log units to rapidly link up with combat units.	Plays resupply through trans- fer cmd through depots; play- ing trucks is cumbersome. (2)
Self-contained	Allows lengthy independent operations.	Through gamer's orders and data in data base. (3)
INDEPENDENT OPS.		
Flexibility	Allows immediate reaction to situation.	Can set increment but can onl interrupt in that increment. Cannot change increment unle game is started at beginning. (2)
Fast paced	Allows constantly changing situation.	Event driven, can only inter- act at time intervals. (2)

DECISION CRITERIA	STANDARDS	MODEL ATTRIBUTES
===	===	===
PROJ. COMBAT POWER		
Rapid concent	Allows rapid projection of combat power from higher hqs anywhere on the battlefield.	Yes, thru gamers & controller (3)
Deep fires	Allows attack of user specified enemy units at a specified point and time.	Yes, gamer entered for another sector. (3)
Combat arms	Allows play of ground direct & indirect fires (incl ADA).	Yes, load all fires effects/ sector, but handles separately and in sequence. (3)
TAC AIR/ ATK HELOS	Allows attack of user specified units at a specified point and time.	Yes, worked out between gamers & controller. (2)
Chemical	Allows offensive and defensive chemical operations.	No. (1)
Nuclear	Allows offensive and defensive operations.	No. (1)
MOVEMENT/MANEUVER		
Agility	Allows maneuver/combat over a large % of AO, rapid unit reorientation, & rapid movement.	Yes, can move units quickly; determined between gamers & controller. (3)
Combat	Must be degraded for combat.	Yes, (1) explicit computer generates movement rates as a result of combat; (2) between gamers & controller. (3)
Terrain	Must be degraded by terrain.	No. (1)
Barrier	Must be degraded for terrain modification.	Yes, done between gamers and controller. (2)
Environment	Allows degradation by day/ night, and weather.	Yes, between gamers & control. Computer does not recognize day, night, or weather. (2)
Chemical	Must be degraded for chemical contamination.	No. (1)

DECISION CRITERIA	STANDARDS	MODEL ATTRIBUTES
===	===	===
C2		
Synch execution	Allows synchronized execution	Worked out between gamers & controller, but not by computer. (2)
Multiple assets	Allows coordinated air & arty fires.	Yes, but poorly; done independently and in sequenc (2)
Battle sequence repetition	Allows continuous scan, swarm, strike, and scatter.	Done between gamers but very difficult and time consumin (2)
Degradation	Allows C2 degradation.	Decided between gamers & controllers off-line. (2)
Headquarters	Executes commander's intent thru C2 hqs.	No C2. Hqs have no effect, can only defend themselves. (1)
Communications	Allows commo delays & spoofing.	No commo played. No delays unless arranged by gamers. (1)
INTELLIGNECE		
Deception	Allows portrayal of dummy units.	Can be done off-line by game and controller. (2)
Sensors	Allows explicit sensor play incl degradation & spoofing.	None. (1)
SITREP	Allows play of SITREP.	None. (1)
DISCONTINUOUS BF		
Maneuverability	Allows various attacks with emphasis on flank & rear.	This is determined by the gamer/controller before/ between CIs. Done off-line. (2)
Hit & run	Allows attrition of enemy units w/o becoming decisive-ly engaged.	Yes. This is determined by the gamers & controller; thresholds are available to change posture. (3)
Specified unit	Gamer can designate unit(s) to be engaged.	This is determined by the gamer/controller before/ between CIs. Done off-line. (2)

.DECISION CRITERIA	STANDARDS	MODEL ATTRIBUTES
Avoid combat	Allows avoidance of combat.	This is determined by the gamer/controller before/ between CIs. Done off-line. (2)
Force definition	Allows light, medium, & heavy CCF play.	This is discussed between th the gamer and controller. (2)
Elastic defense	Allows unit to pass thru area and be subject to delay /attrition.	Gamer/controller discuss be- fore/between CIs. (2)
Airlift	Allows explicit play of air movement of ground forces.	Not explicit, but does allow implicit play. (2)
Landings	Allows airdrop of men and supplies.	Gamer & controller function. (2)

SUSTAINMENT

Consumption	Allows play of consumption of classes III & V.	Only class V. (2)
Blue/Red	Allows play of doctrinal differences in log systems.	None. (1)
Reconstitution	Allows reorganization/ regeneration.	Does allow reorganization. The controller can combine 2 units into 1. Regeneration is done off-line. (2)
Degradation	Allows attrition of log units.	None. (1)
Highly mobile	Allows log units to rapidly link up with combat units.	None. (1)
Self-contained	Allows lengthy independent operations.	Yes, since no log played, supplies are always avail. (3)

INDEPENDENT OPS

Flexibility	Allows immediate reaction to situation.	Gamer/controller determine before CI. Done off-line. (2)
Fast paced	Allows constantly changing situation.	No, once order entered & gam begins, no further opportuni to make changes. (1)

DECISION CRITERIA	STANDARDS	MODEL ATTRIBUTES

PROJ. COMBAT POWER

Rapid concent	Allows rapid projection of combat power from higher hqs anywhere on the battlefield.	Users orders; contained in way units are maneuvered. (3)
Deep fires	Allows attack of user specified enemy units at a specified point and time.	Through weapon characteristics and user orders. Must be arty unit to deep fire. (3)
Combat arms	Allows play of ground direct & indirect fires (incl ADA).	Both ground & indirect fire. (3)
TACAIR / ATK HELOS	Allows attack of user specified units at a specified point and time.	Can play helo or fixed wing units as ground units through user orders. (3)
Chemical	Allows offensive and defen sive chemical operations.	Cannot play. (1)
Nuclear	Allows offensive and defensive operations.	Cannot play. (1)

MOVEMENT/MANEUVER

Agility	Allows maneuver/combat over a large % of AO, rapid unit reorientation, & rapid movement.	Yes. Theater-level model using hexes. (3)
Combat	Must be degraded for combat.	Can move and maneuver around opposition while in combat. (3)
Terrain	Must be degraded by terrain.	Mobility factors affect movement thru hexes. Data driven. (3)
Barrier	Must be degraded for terrain modification.	Not played. Minefield can delay but no attrition. (2)
Environment	Allows degradation by day/ night, and weather.	Plays day/night for attrition but no affect on movement. No weather play. (2)
Chemical	Must be degraded for chemical contamination.	No attrition. Movement degraded for nuc and chem in hex. (2)

DECISION CRITERIA	STANDARDS	MODEL ATTRIBUTES
C2		
Synch execution	Allows synchronized execution.	Can be done by specifying a certain time for an event to occur. (3)
Multiple assets	Allows coordinated air & arty fires.	Control by player thru orders (3)
Battle seq rep	Allows continuous scan, swarm, strike, and scatter.	Gamer sends order for each unit movement. Considerable effort if large number of units. (3)
Degradation	Allows C2 degradation.	Setup unit to rep hqs plus sp unit with C3 capability. When attrited to a certain level, can't communicate. (2)
Headquarters	Executes commander's intent thru C2 hqs.	Gamer is commander. None played by model. (1)
Communications	Allows commo delays & spoofing.	Allows jamming delays, but no spoofing. (2)
INTELLIGENCE		
Deception	Allows portrayal of dummy units.	Could create with no assets & would be subject to attack. (3)
Sensors	Allows explicit sensor play incl degradation & spoofing.	Aircraft only. Degradation; no spoofing. (2)
SITREP	Allows play of SITREP.	Query unit and check graphics map for unit status. (4)
DISCONTINUOUS BF		
Maneuverability	Allows various attacks with emphasis on flank & rear.	Gamer can specify lat-long to manuever around target uni (2)
Hit & run	Allows attrition of enemy units w/o becoming decisively engaged.	Gamer sets thresholds during preproc or during game to mov to another posture. (3)

DECISION CRITERIA	STANDARDS	MODEL ATTRIBUTES
Specified unit	Gamer can designate unit(s) to be engaged.	Gamer can designate units b inputting appropriate order (3)
Avoid combat	Allows avoidance of combat.	Opposing units cannot pass thru same hex or adjacent he no combat if empty hex betwe (1)
Force definition	Allows light, medium, & heavy CCF play.	The TOE is set at beginning game. Terrain accessibility as a function of unit system (3)
Elastic defense	Allows unit to pass thru area and be subject to delay /attrition.	Can only be done by controll by jumping unit over area. Does not allow penetration. (1)
Airlift	Allows explicit play of air movement of ground forces.	1) Helo lifts of small units 2) Airbase to airbase by car plane. (4)
Landings	Allows airdrop of men and supplies.	Not in enemy-occupied hex or surrounding hexes. (2)

SUSTAINMENT		
Consumption	Allows play of consumption of classes III & V.	Attrition/consumption as a function of posture. Can pla any/all supply types. (5)
Blue/Red	Allows play of doctrinal differences in log systems.	Yes, can play either push or pull on either side. (4)
Reconstitution	Allows reorganization/ regeneration.	Cannot reorganize. The controller can regenerate by creating a new unit; can cross level supplies among units. (2)
Degradation	Allows attrition of log units.	Only applies if attrited by air. Player can change sprt units. (2)
Highly mobile	Allows log units to rapidly link up with combat units.	Gamer can put in move rates direct units to move close. Can move air units to supply other units. (3)

.DECISION CRITERIA	STANDARDS	MODEL ATTRIBUTES
===	===	===
Self-contained	Allows lengthy independent operations.	Can be set up in data base during preprocessing. (3)

INDEPENDENT OPS		
Flexibility	Allows immediate reaction to situation.	Player sends order to unit. Gamer performs C2. No decision tables. (2)
Fast paced	Allows constantly changing situation.	Can set game speed so the gamer can react appropriatel (3)

DECISION CRITERIA	STANDARDS	ATTRIBUTES
===	===	===
PROJ. COMBAT POWER		
Rapid concent	Allows rapid projection of combat power from higher hqs anywhere on the battlefield.	The gamer can bring numerous units to the same node. (2)
Deep fires	Allows attack of user specified enemy units at a specified point and time.	Gamer controlled. Make enemy unit stop at node and allow friendly units to attack it there. (2)
Combat arms	Allows play of ground direct & indirect fires (incl ADA).	Gaming techniques determined by where the gamer put arty unit. (2)
TAC AIR/ ATK HELOS	Allows attack of user specified units at a specified point and time.	Able to play effects of air to air, air to ground and ground to air play will be out in April. Attrition of forces not until July. (2)
Chemical	Allows offensive and defen- sive chemical operations.	Will play residual effects of some weapons. Gaming techniques. (2)
Nuclear	Allows offensive and defensive operations.	Yes, gaming techniques. (2)
MOVEMENT/MANEUVER		
Agility	Allows maneuver/combat over a large % of AO, rapid unit reorientation, & rapid movement.	Yes, plays as large as SWA (350Km X 450Km). (3)
Combat	Must be degraded for combat.	Does degrade movement at node. (3)
Terrain	Must be degraded by terrain.	Gamer controlled. (2)
Barrier	Must be degraded for terrain modification.	Can be done subjectively, use intermediate nodes to repre- sent obstacles. (2)
Environment	Allows degradation by day/ night and weather.	Gamer controlled. Off-line. (2)

DECISION CRITERIA	STANDARDS	ATTRIBUTES
===	===	===
Chemical	Must be degraded for chemical contamination.	Gamer controlled. (2)

C2

Synch execution	Allows synchronized execution.	Gamer can route units to arrive at nearby shadow node before gamers give orders to attack in unison. (2)
Multiple assets	Allows coordinated air & arty fires.	Gamer controlled, create air arty units and have them go into node to represent the w effects. (2)
Battle sequence repetition	Allows continuous scan, swarm, strike, and scatter.	Gamer controlled. (2)
Degradation	Allows C2 degradation.	Off-line. (1)
Headquarters	Executes commander's intent thru C2 hqs.	All C2 is played off-line. (1)
Communications	Allows commo delays & spoofing.	Off-line. (1)

INTELLIGENCE

Deception	Allows portrayal of dummy units.	Off-line. (1)
Sensors	Allows explicit sensor play incl degradation & spoofing.	Off-line. (1)
SITREP	Allows play of SITREP.	Off-line. (1)

DISCONTINUOUS BF

Maneuverability	Allows various attacks with emphasis on flank & rear.	Gamer can create a dummy network of the maneuver arou the node where the target un is located. (2)
Hit & run	Allows attrition of enemy units w/o becoming decisive-engaged.	Can be done, but must be don between cycles by changing the force ratio threshold th triggers a unit's withdrawal (2)
Specified unit	Gamer can designate unit(s) to be engaged.	Yes, the gamer can send specific units to the node where the target unit is. (3)

DECISION CRITERIA	STANDARDS	ATTRIBUTES
Avoid combat	Allows avoidance of combat.	Gamer can create dummy nodes and links around nodes where opposing forces are. (2)
Force definition	Allows light, medium, & heavy CCF play.	The attrition at each node can be adjusted to account for terrain effects. (2)
Elastic defense	Allows unit to pass thru area and be subject to delay /attrition.	Can be done by attack unit being attrited/delayed and then have defending unit withdraw from node to node. (3)
Airlift	Allows explicit play of air movement of ground forces.	Units are introduced at a node (implicitly), depart from node with time delays, & are reintroduced at destination node. (3)
Landings	Allows airdrop of men and supplies.	Men only. Landings must occur at nodes. If occupied by opposing unit, conflict occurs. (2)

SUSTAINMENT
Consumption	Allows play of consumption of classes III & V.	Currently plays consumption of ammo (STONS), fuel (gals), and other (STONS). (4)
Blue/Red	Allows play of doctrinal differences in log systems.	No. Log module is weak. Improvement are being made; should be incorporated by mid summer. (1)
Reconstitution	Allows reorganization/ regeneration.	Plays reorganization. Plays consumption & cross-leveling; resupply is weak. (2)
Degradation	Allows attrition of log units.	Log units not attritable at this time. Due in June. (1)
Highly mobile	Allows log units to rapidly link up with combat units.	Log units and maneuver units can be directed to the same node for linkup (by gamer). (3)

DECISION CRITERIA	STANDARDS	ATTRIBUTES
Self-contained	Allows lengthy independent operations.	Units can be given extra supplies at beginning or during game. (3)
INDEPENDENT OPS		
Flexibility	Allows immediate reaction to situation.	Gamer controlled. At end of cycle, gamer checks situatio and takes appropriate action (2)
Fast paced	Allows constantly changing situation.	Generally gamer controlled, but the game has thresholds that trigger some actions. (3)

ARMY 21 CRITERIA SCORE SUMMARY

DECISION CRITERIA	CFAW	CORBAN	IDAHEX	JIFFY	JTLS	SOTACA
PROJ. COMBAT POWER						
Rapid concent.	3	3	3	3	3	2
Deep fires	2	3	1	3	3	2
Combat arms	3	3	2	3	3	2
TACAIR/ATK HELOS	3	3	3	2	3	2
Chemical	2	1	1	1	1	2
Nuclear	2	1	1	1	1	2
MOVEMENT/MANEUVER						
Agility	2	3	3	3	3	3
Combat	2	4	4	3	3	3
Terrain	3	3	3	1	3	2
Barrier	4	1	4	2	2	2
Environment	2	1	1	2	2	2
Chemical	4	1	3	1	2	2
C2						
Synch. execution	2	2	3	2	3	2
Multiple assets	1	3	2	2	3	2
Battle seq. rep.	2	2	1	2	3	2
C2 degradation	2	4	1	2	2	1
Headquarters	1	4	1	1	1	1
Communications	1	3	1	1	2	1
INTELLIGENCE						
Deception	3	3	3	2	3	1
Sensors	3	2	1	1	2	1
SITREP	2	4	3	1	4	1
DISCONTINUOUS BF						
Maneuverability	2	4	3	2	2	2
Hit & run	3	2	3	3	3	2
Specified unit	3	3	4	2	3	3
Avoid combat	1	1	4	2	1	2
Force definition	3	3	3	2	3	2
Elastic defense	1	1	1	2	1	3
Airlift	4	3	2	2	4	3
Landings	3	2	3	2	2	2
SUSTAINMENT						
Consumption	5	3	4	2	5	4
Blue/Red	1	3	3	1	4	1
Reconstitution	3	3	2	2	2	2
Degradation	1	3	2	1	2	1
Highly mobile	1	3	2	1	3	3
Self-contained	3	3	3	3	3	3
INDEPENDENT OPS						
Flexibility	2	4	2	2	2	2
Fast paced	2	4	2	1	3	3

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